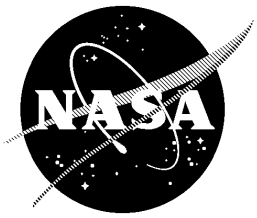
451-TR-NCCDS/99.1

FLIGHT PROJECTS DIRECTORATE

Network Control Center Data System (NCCDS) Service Planning Segment Replacement (SPSR) Release 99.1

Test Report

June 1999



National Aeronautics and Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

Network Control Center Data System (NCCDS)
Service Planning Segment Replacement (SPSR)
Release 99.1
Test Report

June 1999

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Preface

This document, the *Network Control Center Data System (NCCDS) Service Planning Segment Replacement (SPSR) Release 99.1 Test Report* provides a summary of the system testing activities, including final status summaries and Year 2000 verification testing for SPSR 99.1.

Questions concerning this document shall be addressed to:

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Abstract

This document presents the report for testing of SPSR 99.1 software. It contains the following:

- Schedule of completed activities and milestones
- Description of the test environments
- Documents used as a basis for validating the SPSR 99.1 software
- Final status summaries

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Section 1. Introduction

1.1 Purpose and Scope

This document, the *Network Control Center Data System (NCCDS) Service Planning Segment Replacement (SPSR) Release 99.1 Test Report*, describes the testing materials and procedures that were used to verify that the software delivered with SPSR 99.1 fulfilled its allocated requirements and system level functionality. This document was prepared to report the results of the SPSR 99.1 system testing phase, including functional testing, regression testing, and Year 2000 verification testing.

The scope of the document includes information regarding the system capabilities and configuration, the test schedule, and the test results.

1.2 Applicable Documents

The following documents were either referenced during the preparation of this report, or were applicable to the testing of SPSR 99.1.

a. *Network Control Center Data System, 1998 (NCC 98) System Test Test Plan*, 530-STP-NCCDS/R98, October 1995

b. *Network Control Center Data System (NCCDS) System Requirements, 1998*, 530-SRD-NCCDS/1998, Revision 2 Draft, April 1998

c. *Interface Control Document between the Network Control Center Data System and the Mission Operations Centers*, 451-ICD-NCCDS/MOC, Revision 1 Draft, December 1998

d. *Interface Control Document Between the Network Control Center Data System and the Nascom Control and Status System*, 530-ICD-NCCDS/NASCOM, Revision 2, December 1995

e. *Interface Control Document between the Network Control Center Data System and the Sensor Data Processing Facility*, 530-ICD-NCCDS/SDPF, Revision 2, December 1995

f. *Interface Control Document (ICD) between the Network Control Center (NCC)/Flight Dynamics Facility (FDF) and the White Sands Complex (WSC)*, 530-ICD-NCC-FDF/WSC, Revision 5, June 1997

g. *SPSR User's Guide* (Online), continuous updates

h. *CCS User's Guide* (Online), January 1999

i. *NPG User's Guide*, January 1999

j. *Network Control Center (NCC) Central Delogger (NCD) User's Manual*, Release 98.1, January 1999

k. *Network Control Center (NCC) Test System (NTS) User's Manual*, Release 98.1, February 1998

l. *Firewall User's Guide*, Release 98.1, Revision 3, December 1998

m. *NASA Year 2000 Agency Test and Certification Guidelines and Requirements, Volume 1*, July 2, 1998

n. UIFCs and Data Rates white paper, September 25, 1998

o. NCCDS SPSR 99.1 System Test Completion Letter, June 29, 1999

1.3 Assumptions

This test plan assumes that the reader has a basic understanding of the NCCDS configuration for SPSR 99.1 and the NCC operational capabilities. Standard terminology as applied to the NCC by NASA is used whenever possible.

Section 2. System Testing

2.1 Overview

During NCC 98 Initial Release system testing, it was determined that the project would not be able to meet the deadline for Y2k validation of NCC 98.1 with all of the planned functionality. At that point, it was decided that the following functional capabilities would be deferred until a completion release:

- Keyword Service-Level Flexibility
- Tracking Data and Relay Satellite (TDRS) Scheduling Windows (TSWs)
- Alternate Schedule Add Requests (SARs)
- TDRS Flexibility
- Wait List
- Flexible Events

This formed the basis for the NCC 98 Completion Release, also known as SPSR Release 99.1.

2.2 Functional Testing

The objective of System Test Functional Testing was to verify that the requirements related to the contents of SPSR Release 99.1 had been met. Test objectives and detailed test procedures were developed for each functional test item listed in Table 2-1. The test procedures were delivered to the NCC 98 web page.

Table 2-1. Functional Test Items

Test Item	Test Item Title
99.1-2.01	Service Level Flexibility – Ordering, Automatic
99.1-2.02	Service Level Flexibility – Ordering, Batch
99.1-2.03	Service Level Flexibility – CSN & SBSN, Automatic
99.1-2.04	Service Level Flexibility – CSN & SBSN, Batch
99.1-2.05	Service Level Flexibility – Types of Conflicts, Automatic
99.1-2.06	Service Level Flexibility – Types of Conflicts, Batch
99.1-2.07	Service Level Flexibility – EET, Tracking, and Coherent Pairs, Automatic
99.1-2.08	Service Level Flexibility – EET, Tracking, and Coherent Pairs, Batch
99.1-2.09	Service Level Flexibility – Event Tolerances with Service Flexibility – Automatic
99.1-2.10	Service Level Flexibility – Event Tolerances with Service Flexibility – Batch
99.1-3.01	Invalid TSWs
99.1-3.02	Valid TSWs
99.1-3.03	TSWs – Automatic Scheduling
99.1-3.04	TSWs – Batch Scheduling
99.1-3.05	Effects of TSW Updates
99.1-3.06	TSW Updates before Activation
99.1-4.01	TDRS Selection – Automatic Scheduling

Test Item	Test Item Title
99.1-4.02	TDRS Selection – Batch Scheduling
99.1-5.01	Invalid Wait List Requests – MOC Requests
99.1-5.02	Invalid Wait List Requests – Operator Requests
99.1-5.03	Valid Wait List Requests – MOC Requests
99.1-5.04	Valid Wait List Requests – Operator Requests
99.1-5.05	Activated Schedule Wait List Processing
99.1-5.06	Scheduling from Wait List – Automatic Mode
99.1-5.07	Scheduling from Wait List – Semi-automatic Mode
99.1-5.08	Wait List Enable and Inhibit
99.1-5.09	Wait Listing Alternate SARs – MOC Requests
99.1-5.10	Wait Listing Alternate SARs – Operator Requests
99.1-6.01	Flexible USMs – Simulation Support
99.1-6.02	Flexible USMs – Normal Support
99.1-6.03	Schedule Request Freeze Interval is Reached
99.1-6.04	Default Freeze Interval is Reached
99.1-6.05	Events Frozen When Selected for Transmission
99.1-6.06	Flexible TUT
99.1-7.01	Invalid Alternate SARs – MOC Requests
99.1-7.02	Invalid Alternate SARs – Operator Requests
99.1-7.03	Valid Alternate SARs – MOC Requests
99.1-7.04	Valid Alternate SARs – Operator Requests
99.1-7.05	Chain Management – Edited Requests
99.1-7.06	Scheduling using Chains – Primary Requests
99.1-7.07	Scheduling using Chains – Secondary Requests
99.1-9.01	Database Purging
Total	42

A pre-testing phase was conducted in December of 1998, before the delivery of Release 99.1 Build 1. This phase focused on the Keyword Service-Level Flexibility functionalities because that functionality was tested very little during NCC 98 Initial Release system testing. The objective of this testing was to identify additional problems in an area that was considered to be high risk due to the level of complexity and in sufficient time to be resolved with the Build 2 delivery.

Build 1 functional testing started on January 5, 1999. The Build 1 delivery included the functionality for Wait List Processing and TDRS Scheduling Windows.

System Test began functional testing of Build 2 on February 8, 1999. The functional content included Keyword Service-Level Flexibility, TDRS Flexibility, Event Flexibility, and Alternate SARs. All of the Keyword Service-Level Flexibility tests executed during the pre-testing phase were repeated during B2 testing.

2.3 Regression Testing

Regression testing began in April 1999. XRunner, an automated test tool, was used to help conduct the regression testing. The objective of regression testing was to verify that the NCC 98 Initial Release capabilities functioned the same in SPSR 99.1. Outlines and automated test scripts were written to accomplish this, however, some regression tests still had to be tested manually. The specific test items are listed in table 2-2.

The regression tests were run first on the NCC 98 Initial Release to establish baseline results. The tests were then run on Build 2, Patch f++ of SPSR Release 99.1. The results of the second run were compared to the Initial Release results. Because fixes continued to be delivered to the Initial Release until May 3, and Build 2, Patch f++ was not delivered to the Completion Release until May 14, regression testing did not end until May 21, even though it started in April. After the completion of system testing, Build 2, Patch g was delivered to the Completion Release. There were two PRs delivered with this patch. System Test verified the PR resolutions, but did not repeat the regression tests due to time constraints and the low risk level associated with the patch.

Table 2-2. Regression Test Items

Test Item	Test Item Title	Manual vs. Automatic	Script Name
99.1-10.01	Receipt of Acquisition Data	Automatic	AT_driver iirv_selec2 vector_storage
99.1-10.02	Editing of Acquisition Data	Automatic	AT_driver view_edit vector_storage
99.1-10.03	Transmission of Acquisition Data	Automatic	AT_driver at_man_trn
99.1-10.04	SN Database - TDRS ID, Names, GT/SGLT sets, mappings	Automatic	db_main
99.1-10.05	SN Database - Resource Availability	Manual	
99.1-10.06	SN Database - MDM/HDRM	Automatic	DB_driver driver_mdm_hdrm
99.1-10.07	SN Database - TDRS Sets	Automatic	DB_driver tdrs_sets
99.1-10.08	Customer Database - General	Automatic	cus_dtb_driver2 uifc dqm nsc_prm par_rec_ovr
99.1-10.09	Customer Database - SSCs	Automatic	DB_driver ssc ssd_test2
99.1-10.10	Schedule Control Database - Scheduling Priorities	Automatic	schedule_control_data priority_lists
99.1-10.11	Schedule Control Database - Boundaries, Alerts, SA Slew Time	Automatic	schedule_control_data
99.1-10.12	Schedule Control Database - Data Retention	Automatic	schedule_control_data purge_control
99.1-10.13	SSAF - SSAR Reconfigurations	Manual	
99.1-10.14	KuSAF - KuSAR Reconfigurations	Manual	
99.1-10.15	KaSAF - KaSAR Reconfigurations	Manual	
99.1-10.16	SMAF - SMAR Reconfigurations	Manual	
99.1-10.17	MAF - MAR Reconfigurations	Manual	
99.1-10.18	NCD	Manual	
99.1-10.19	User Performance Data	Automatic	NM_driver driver_odm_upd2
99.1-10.20	NM OPMs	Automatic	NM_driver nm_opm1

Test Item	Test Item Title	Manual vs. Automatic	Script Name
99.1-10.21	Invalid Replace Requests	Automatic	driver_rep_req driver_bat_moc_rep_inv driver_aut_moc_rep_inv
99.1-10.22	Valid Replace Requests	Automatic	driver_rep_req driver_val_rep_bat driver_val_rep_aut
99.1-10.23	Delete Requests	Automatic	driver_del_req driver_del_act_sar_moc driver_del_bat_sar_moc driver_del_act_sar_op driver_del_bat_sar_op
99.1-10.24	Initial Activation Mode Schedule Transmission	Automatic	driver_ini_act
99.1-10.25	Manual Mode Schedule Transmission	Automatic	driver_man_sch_trn
99.1-10.26	Semi-Automatic Mode Schedule Transmission	Automatic	driver_semi_auto
99.1-10.27	STRS Options	Automatic	driver_strs
99.1-10.28	Schedule Message Formats	Automatic	driver_sho_usm
99.1-10.29	SA/MA/SMA Scheduling Rules	Manual	
99.1-10.30	EET Scheduling Rules	Manual	
99.1-10.31	Tracking Scheduling Rules	Manual	
99.1-10.32	Minimum Gap Scheduling Rules	Manual	
99.1-10.33	TDRS Availability Scheduling Rules	Manual	
99.1-10.34	SGLT Availability Scheduling Rules	Manual	
99.1-10.35	UIFC Scheduling Rules	Manual	
99.1-10.36	MDM/HDRM Bandwidth Scheduling Rules	Automatic	driver_mdm_hdrm
99.1-10.37	Maximum Composition Data Rate Scheduling Rules	Manual	
99.1-10.38	TUT--SA	Manual	
99.1-10.39	TUT-- MAF/SMAF	Manual	
99.1-10.40	TUT--MAR/SMAR	Manual	
Total	40		

2.4 Year 2000 Testing

2.4.1 Functional

System Test developed test objectives and detailed test procedures to verify that the capabilities implemented in SPSR 99.1 were Y2K compliant. These test procedures were delivered to the NCC 98 web page. The Year 2000 Testing verified SPSR Release 99.1 functionality for each of the following system dates:

- December 31, 1999 to January 1, 2000 (Julian day 365 to 001)
- December 30, 2000 to December 31, 2000 (Julian day 365 to 366)
- December 31, 2000 to January 1, 2001 (Julian day 366 to 001)

Below is a list of the test items established to verify Y2K compliance.

Table 2-3. Year 2000 Test Items

Test Item	Test Item Title
99.1-8.01	Year 2000 - TSW retention
99.1-8.02	Year 2000 - Scheduling with TSWs, Service Flexibilities - Auto
99.1-8.03	Year 2000 - Scheduling with TSWs, Service Flexibilities - Batch
99.1-8.04	Year 2000 - Wait Listing

2.4.2 Regression

The 40 regression tests previously listed were performed with the system clocks set past the century rollover, thus validating that the existing NCC 98 Initial Release capabilities remained Year 2000 compliant. In total, both test berths ran from March 26, 1999 to May 21, 1999 with the system clocks set after the century rollover.

2.5 Test Schedule

The following figure diagrams the actual schedule of SPSR Release 99.1 System Test activities:

ID	Task Name	Start	Finish
1			
2	**System Test Procedures**	**Mon 11/16/98**	**Fri 2/5/99**
3	99.1 Test Procedures	Mon 11/16/98	Fri 2/5/99
4			
5	**System Test Execution**	**Thu 12/3/98**	**Fri 5/21/99**
6	Keyword Flexibility Testing	Thu 12/3/98	Mon 12/28/98
7	Build 1 STRR	Tue 12/29/98	Tue 12/29/98
8	Build 1 Functional Testing	Tue 1/5/99	Fri 2/5/99
9	Build 2 STRR	Wed 2/3/99	Wed 2/3/99
10	Build 2 Functional Testing	Mon 2/8/99	Mon 5/3/99
11	Regression Testing	Fri 4/2/99	Fri 5/21/99
12			
13	**Year 2000 Testing**	**Mon 3/22/99**	**Fri 5/21/99**
14	Functional	Mon 3/22/99	Fri 4/2/99
15	Regression	Fri 4/2/99	Fri 5/21/99

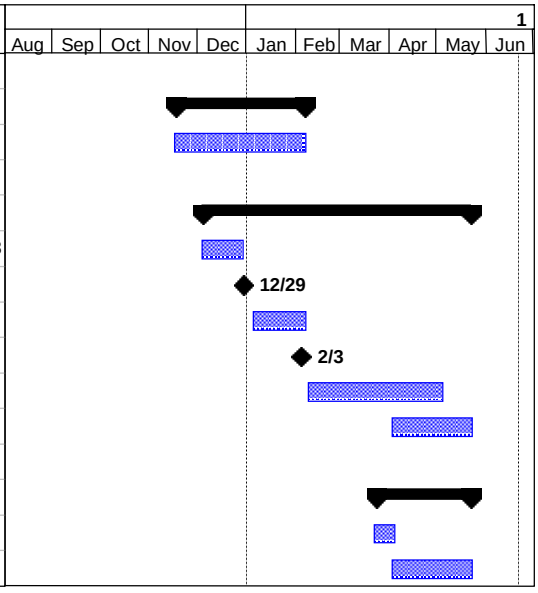


Figure 2-1. System Test Activities Schedule

The completion of system testing is documented in the *NCCDS SPSR Release 99.1 System Test Completion Letter*, dated June 29, 1999.

2.6 Test Environment and Configurations

Test execution was performed at the Test & Training facility (T&T) in Building 13 at GSFC, in Test Berths 2 and 3. Test berth 3 supported the full complement of components, except for the NSM, and mirrored the operational environment excluding redundancy. Test Berth 2 supported a partial complement of components, lacking CCS, NSM, and the WWW Server. The Release 99.1 configuration is diagramed in Appendix A of this document.

2.7 Archiving of Results

The test record process was the same for System Testing of SPSR Release 99.1 as it was for NCC 98 Initial Release. The test records were archived and will be used for future analysis, as comparison data for regression testing, and for reference during the planning and testing phases of subsequent releases.

2.8 Final Status Summary

2.8.1 Test Item Summary

The final status of each individual system test item, including test priority, actual start and completion dates, pass/fail status, and problem reports written, can be found in Appendix B. During system testing, 86 test items were started, 80 passed, and 6 were waived. The waived test items were a result of related PRs that were not resolved, but were accepted for conversion. Except for the steps in the 6 test items related to the converted PRs, all other test steps were completed and passed. The following table provides the breakdown of SPSR 99.1 test items.

Table 2-4. Release 99.1 Test Status

Priority	Total	# Started	# Passed	# Waived
Build 1	14	14	14	0
Build 2	28	28	22	6
Y2K	4	4	4	0
Regression	40	40	40	0
Total	86	86	80	6

System testing of SPSR Release 99.1 experienced a productivity level of 0.43 test items per tester per week. The productivity level for NCC 98 averaged 0.42 test items per tester per week. Several factors attributed to the low productivity level. There was a high initial failure rate for test items (34.1%). Also, software was not frozen on its original date, which meant that PR resolutions were continuing to be delivered. This greatly impacted regression testing because regression tests needed to be run on the final version of SPSR software. The contents of this

release were very complex which could account for slow turnaround time for PRs and slow productivity for testing.

The following charts depict the system test productivity and progress during SPSR Release 99.1 system testing:

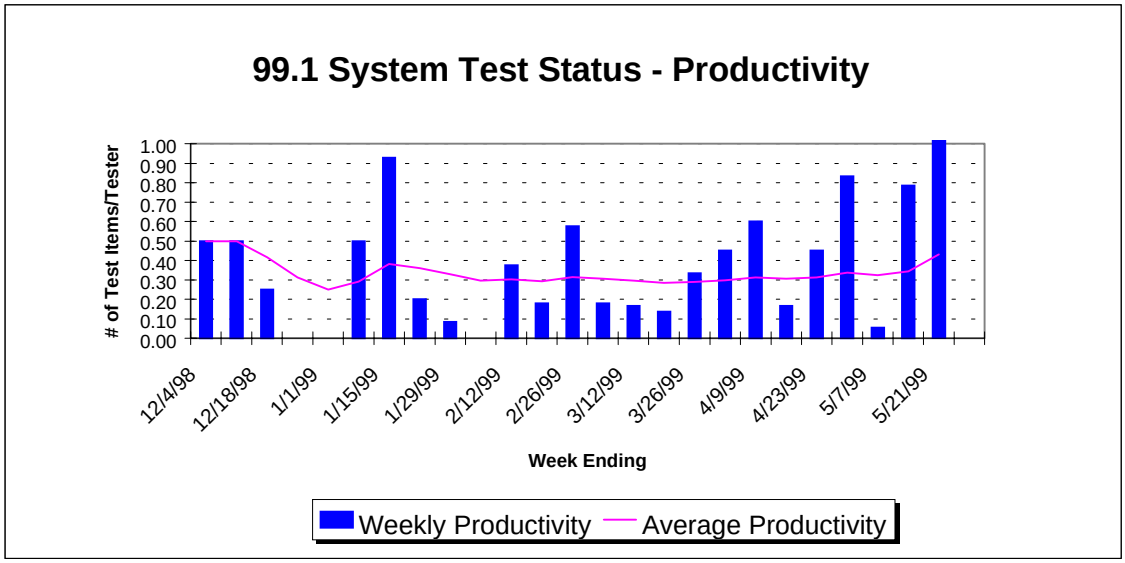


Figure 2-2. System Test Productivity

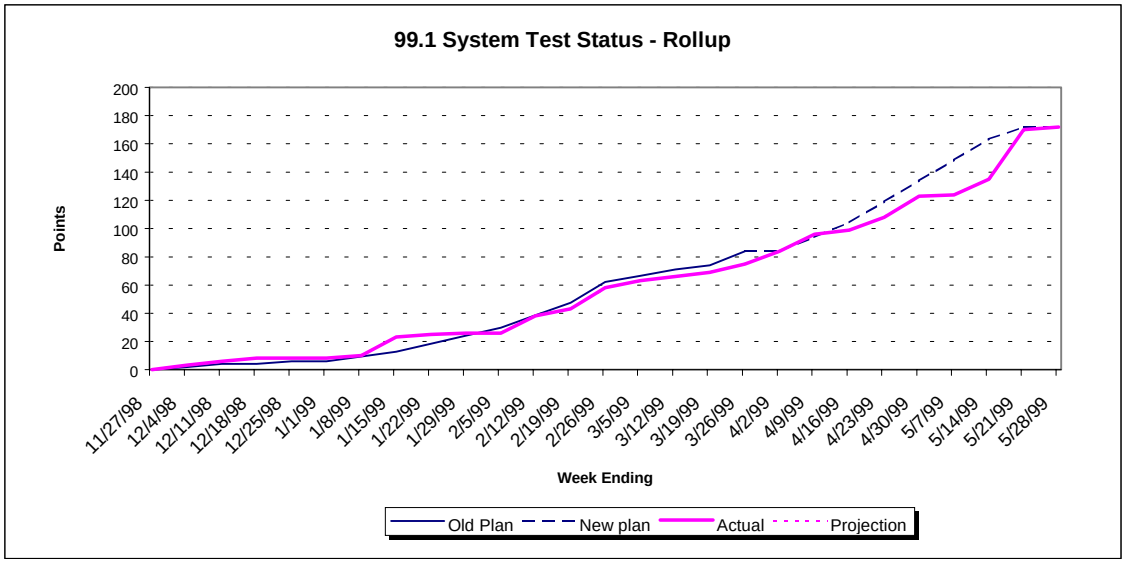


Figure 2-3. System Test Progress – Rollup

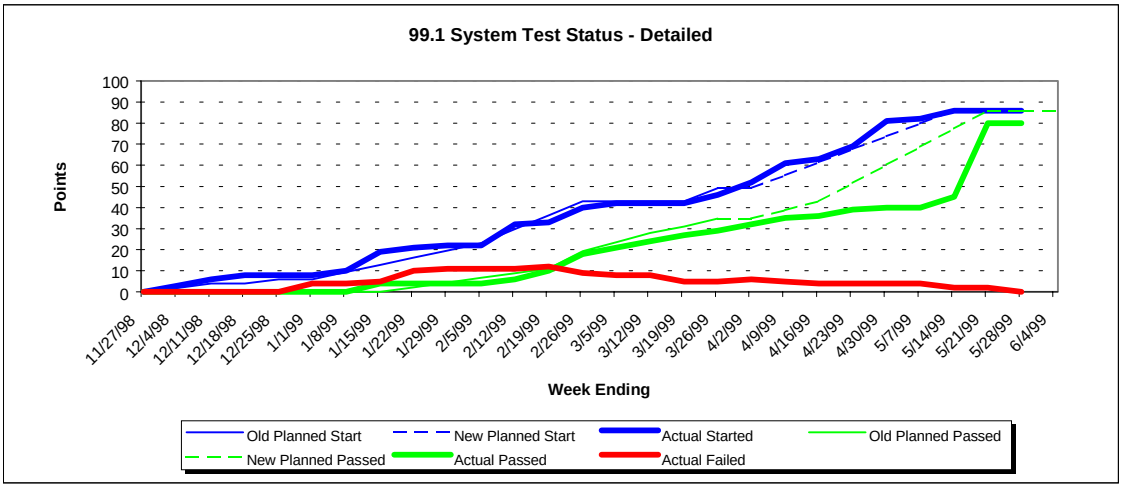


Figure 2-4. System Test Progress - Detailed

2.8.2 Problem Report Status

The following table provides the total number of PRs written per segment and per priority during the system testing phase of SPSR 99.1:

Table 2-5. Release 99.1 System Test Problem Reports

Segment	Priority 2	Priority 3	Priority 4	Total
SPSR	24	132	37	193
SysAdmin	0	5	0	5
NSM	0	1	0	1
Total	24	138	37	199

The following tables provide the number of PRs written during system testing of each build of SPSR Release 99.1. The tables are broken down by segment and priority.

Table 2-6. Pretesting Phase - System Test Problem Reports

Segment	Priority 2	Priority 3	Priority 4	Total
SPSR	0	7	2	9
Total	0	7	2	9

Table 2-7. Build 1 - System Test Problem Reports

Segment	Priority 2	Priority 3	Priority 4	Total
SPSR	6	7	2	15
Total	6	7	2	15

Table 2-8. Build 2 - System Test Problem Reports

Segment	Priority 2	Priority 3	Priority 4	Total
SPSR	18	118	33	169
SysAdmin	0	5	0	5
NSM	0	1	0	1
Total	18	124	33	175

2.9 Lessons Learned

2.9.1 Assessments

The following are SPSR Release 99.1 assessments for the system testing phase:

1. XRunner experienced problems recognizing GUI Map files, windows, and objects (buttons, fields, etc.). This is believed to be in part due to delivery of 99.1 patches involving GUI changes.
2. SPSR GUI changes necessitated altering of XRunner scripts due to font changes.
3. Need cross-reference list of regression script filenames to regression test items.
4. There was some miscommunication as to how XRunner scripts related to one another. Some duplication of testing occurred due to different people working on the same functional area. There was also some miscommunication with respect to the overall goal of having XRunner perform checkpoints to eliminate the need to manually check the output of the automated scripts.

5. As a result of tester unfamiliarity with XRunner, we focused more on getting the scripts to run without errors and did not focus enough on the test design or the test output.
6. After many of the patch deliveries, windows could not be opened and log files could not be accessed on the workstations.
7. Occasionally the integrity of the environment was not preserved, cleanup steps were not always performed after a test, and changes to NPG or database were not always returned to their nominal or standard settings.
8. Testers did not always know how to perform functions such as modifying the NPG configuration files or how to perform a database purge.
9. During Year 2000 testing, system clocks were not always set to the correct times for all necessary segments.
10. After Year 2000 testing was completed, clocks were left in the year 2001 (since regression testing was also to be performed in 2001 and since it is not advisable to roll back system clocks unless necessary). But confusion resulted from the times not being at least set to the current day of the year (DOY) in 2001. (This was only a problem in Test Berth 3. Test Berth 2 did use the current DOY).
11. Inexperience with using all NTS commands and utilities somewhat hindered regression and Long Duration Test development.
12. Occasionally NPG was not configured correctly, therefore unnecessary time was spent analyzing what happened to particular messages.
13. When problems occurred with the Firewalls after regular hours, lack of tester experience with the Firewall prevented any further testing until the problem was resolved.
14. A patch checkout was performed on an old patch.
15. As a result of a Lesson Learned after a previous release, System Test created a problem report notebook to facilitate faster certification of PRs. The individual PR queues were efficient in the early phases of testing. The problem report notebook was more effective at the end of the release.
16. It was determined that certification of a completed test should be performed as early as possible to allow deficiencies to be corrected in a timely manner. To encourage getting certifications done early we instituted an email reminder process.
17. SSCs that are designated for particular tests such as regression tests, were modified and caused unexpected results during the next execution of the regression test.
18. During PR verification, it was sometimes difficult to reproduce the scenario that caused the PR.
19. PR analysis was sometimes slowed by the unavailability of supporting hardcopies related to the problem report.

20. Test procedures were not always accessible.

21. Started testing some high risk test items before any system testing of 99.1 began, allowing us to uncover problems early. Pretesting maximized the use of time in a tight schedule and it also helped development deliver a better quality second functional build.

2.9.2 Recommendations

Based on the system testing of the SPSR Release 99.1, it is recommended that System Test:

1. To resolve the problems with the GUI Map files not being recognized by XRunner, the following should be implemented:
    a. Automate the patch checkout (a quick check of the functionality of the system that was implemented as the result of previous lessons learned) that is currently done manually after the delivery of every patch. This will alert everyone as soon as possible of the need to update GUI Map files.
    b. After the delivery of every patch compare GUI Map files to windows using tools such as the GUI Spy.
    c. Have all objects within the same window defined in the same GUI Map file.
    d. Have all windows within the same subsystem, for example, Space Network Database, defined within the same GUI Map file.
2. Whenever possible, try not to use XRunner functions such as *get_text* that are not as flexible and are more likely to be affected by font changes.
3. Have a standard naming convention for XRunner scripts. Also, have better configuration management of the scripts, saving them in an organized fashion, in a central location, viewable by all, but modifiable by a designated person with a trained backup. All work leading up to the final version of the script should be performed on a copy of the CM version and then the designated CM person should copy the deliverable version into the CM directory.
4. For similar efforts in the future, implementing the following suggestions would improve the communication in relation to the regression XRunner scripts:
    a. Have more meetings to iron out details and eliminate miscommunication.
    b. Designate a group of people whose only task is to work on XRunner development instead of having a large group of people that intermittently work on XRunner development in addition to functional testing.
5. For similar efforts in the future, implementing the following suggestions would improve the design and output of the XRunner scripts:
    a. Incorporate the expected output in the outline and perform a closer review of outlines prior to script development.

b. Have a smaller scope of automation. Start by automating a single subset or subsystem of SPSR and perfect that before moving on to other subsystems.

c. Create a template for regression test outlines that fills the special needs of automated regression tests.

d. After milestones or goals are missed, have frequent meetings with all members of the team to ensure they understand the new priorities, the recovery plan, and the importance of not attempting to accomplish more than can realistically be done in the available timeframe.

e. Write a Review Standard and Procedure that addresses the specific needs of automated test scripts, including specifying the types of expertise needed at the review, and a checklist for the requirements of the scripts including script format and design, as well as test objectives and design.

6. System Test should write problems reports when windows cannot be opened, even if it is a problem that can/must be fixed immediately by SysAdmin. Documenting the problems will capture the information needed to improve the processes of delivering future patches.

7. Create a notebook or checklist of nominal settings for things such as the NPG configuration, normal TDRS Operational Names and Mappings, SAR Start Time or Freeze Intervals, list of baseline and full support customers, and others.

8. Update our "How-to" procedures book to contain all necessary procedures and replace or eliminate obsolete procedures.

9. Come up with a checklist (and include it in the "How-to" procedures book) containing what segments need to have their clocks changed and a procedure for how to change them.

10. After the rollover, keep the year the same, but change to the current day and time.

11. Testers should become more familiar with NTS commands other than the basic commands. Use more NTS commands in routine functional testing or create NTS timelines during other testing efforts such as regression test development.

12. Ensure that NPG configuration files are configured correctly for the customer messages used in testing.

13. Ensure that procedures exist for how to check if the Firewall is up and running and how to reboot it if it's not, and make sure that testers are familiar with them.

14. Make "Verification of the Patch ID" the first step in patch checkouts. Put the command for how to check which patch we are running in the "How-to" procedure book.

15. Continue using a PR notebook toward the end of the testing phase as some testers complete functional tests and can be dedicated to PR checkout.

16. Continue to certify test items as early as possible.

17. To ensure the integrity of the regression test SSCs, the following will be implemented:

    a. Each tester currently has a letter assigned to them and should only make changes to SSCs that begin with that letter. The list of which testers are assigned which letters needs to be updated as testers join and leave the project and this list needs to be "made more public" so that everyone is aware of who is assigned what letter.

    b. No changes should be made to any database that is separate and used only for special testing.

    c. SSCs used in regression tests should be well documented and copies kept in case of accidental modification so that the original values can be restored.

    d. Make a comment in the description field of the SSC to identify it as a regression test SSC.

18. The author of the PR should describe the exact testing scenario that resulted in the problem report. That scenario should include specific times and data used.

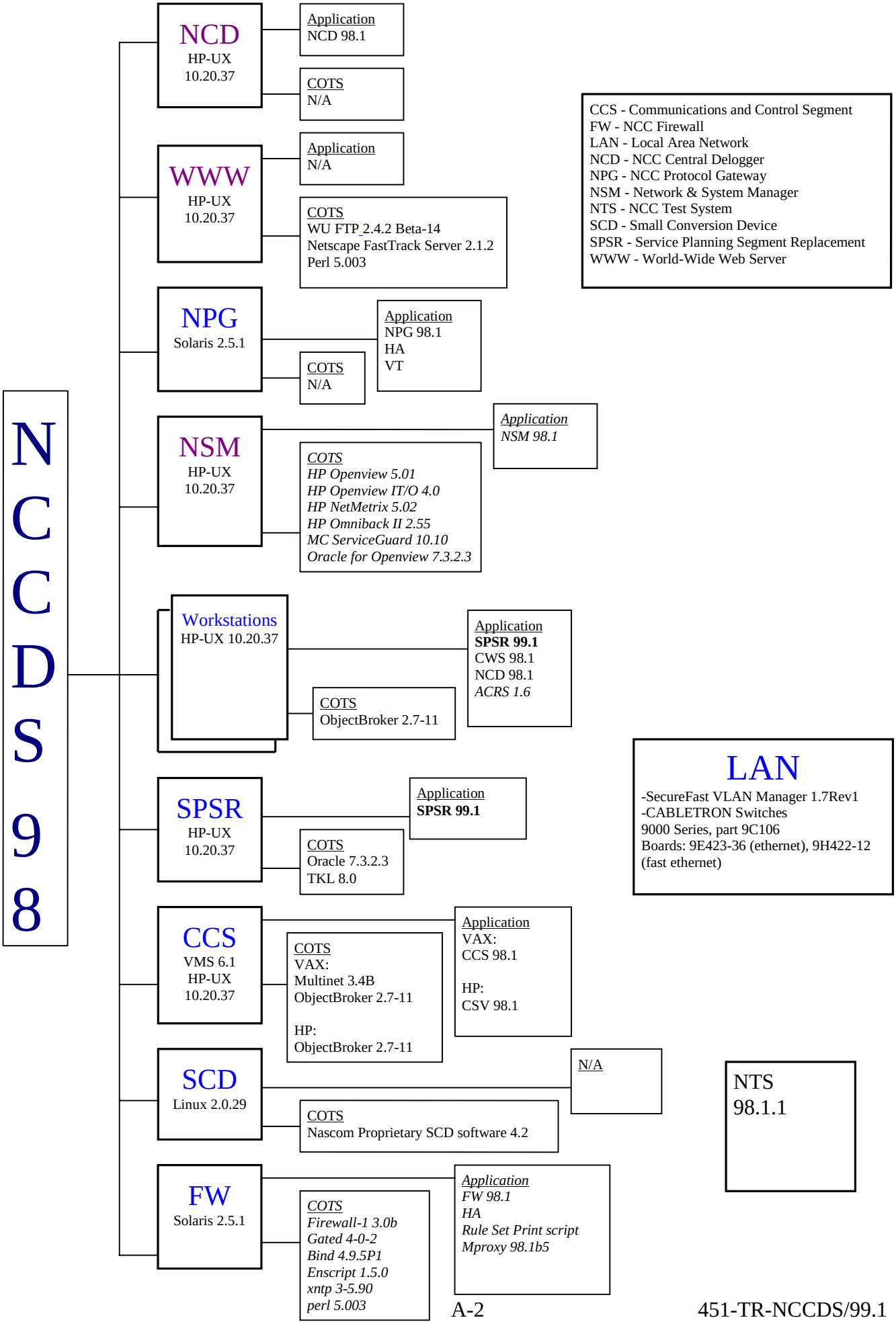
19. Testers should be more diligent about putting their PR hardcopies in the designated place so that developers can begin their analysis as soon as possible.

20. Test procedures should be put online before testing begins.

21. Continue to use this "pre-testing" tactic when feasible.

Appendix A. Release 99.1 System Test Configuration

The following figure diagrams the system test configuration for SPSR Release 99.1.


NCCDS98
NCD
HP-UX
10.20.37
Application
NCD 98.1
COTS
N/A
WWW
HP-UX
10.20.37
Application
N/A
COTS
WU FTP 2.4.2 Beta-14
Netscape FastTrack Server 2.1.2
Perl 5.003
NPG
Solaris 2.5.1
Application
NPG 98.1
HA
VT
COTS
N/A
NSM
HP-UX
10.20.37
Application
NSM 98.1
COTS
HP Openview 5.01
HP Openview IT/O 4.0
HP NetMetrix 5.02
HP Omniback II 2.55
MC ServiceGuard 10.10
Oracle for Openview 7.3.2.3
Workstations
HP-UX 10.20.37
Application
SPSR 99.1
CWS 98.1
NCD 98.1
ACRS 1.6
COTS
ObjectBroker 2.7-11
SPSR
HP-UX
10.20.37
Application
SPSR 99.1
COTS
Oracle 7.3.2.3
TKL 8.0
CCS
VMS 6.1
HP-UX
10.20.37
COTS
VAX:
Multinet 3.4B
ObjectBroker 2.7-11
HP:
ObjectBroker 2.7-11
Application
VAX:
CCS 98.1
HP:
CSV 98.1
SCD
Linux 2.0.29
N/A
COTS
Nascom Proprietary SCD software 4.2
FW
Solaris 2.5.1
COTS
Firewall-1 3.0b
Gated 4-0-2
Bind 4.9.5P1
Enscript 1.5.0
xntp 3-5.90
perl 5.003
Application
FW 98.1
HA
Rule Set Print script
Mproxy 98.1b5
CCS - Communications and Control Segment
FW - NCC Firewall
LAN - Local Area Network
NCD - NCC Central Delogger
NPG - NCC Protocol Gateway
NSM - Network & System Manager
NTS - NCC Test System
SCD - Small Conversion Device
SPSR - Service Planning Segment Replacement
WWW - World-Wide Web Server
LAN
-SecureFast VLAN Manager 1.7Rev1
-CABLETRON Switches
9000 Series, part 9C106
Boards: 9E423-36 (ethernet), 9H422-12
(fast ethernet)
NTS
98.1.1

Appendix B. System Test Items

This appendix contains a listing of all the System Test items executed during SPSR Release 99.1 system testing.

The status column records the final status of each test's objectives: Passed (P) or Waived (W). In order for System Test to be considered complete, no test item could be in the Failed state. A test item was not Passed until all PRs written against the test objectives were resolved and verified. Because all PRs were not resolved during Release 99.1 testing, a test item was considered Waived if any PR remained open. The Waived status was not assigned until the open PRs were approved for conversion.

System Test Items

Test Item	Title	Priority	Start	Complete	Status	PRs
99.1-2.01	Service Level Flexibility - Ordering, Automatic	H	12/3/98	2/23/99	P	3062
99.1-2.02	Service Level Flexibility - Ordering, Batch	H	12/11/98	2/26/99	P	
99.1-2.03	Service Level Flexibility - CSN & SBSN, Automatic	H	12/4/98	3/10/99	P	*3038*, 3040, 3113
99.1-2.04	Service Level Flexibility - CSN & SBSN, Batch	H	12/11/98	3/11/99	P	3113
99.1-2.05	Service Level Flexibility - Types of Conflicts, Automatic	H	12/3/98	2/22/99	P	3034, 3035, *3043*, 3063
99.1-2.06	Service Level Flexibility - Types of Conflicts, Batch	H	12/9/98	2/26/99	P	
99.1-2.07	Service Level Flexibility - EET, Tracking, and Coherent Pairs, Auto	H	12/4/98	4/21/99	W	3129, 3138, 3244*, 3246*
99.1-2.08	Service Level Flexibility - EET, Tracking, and Coherent Pairs, Batch	H	12/11/98	4/22/99	W	3129, 3138, 3244*, 3246*
99.1-2.09	Service Level Flexibility - Event Tolerances with Service Flexibility - Auto	H	2/9/99	2/10/99	P	
99.1-2.10	Service Level Flexibility - Event Tolerances with Service Flexibility - Batch	M	2/11/99	2/11/99	P	
99.1-3.01	Invalid TSWs	M	1/20/99	3/3/99	P	3218
99.1-3.02	Valid TSWs	H	1/12/99	3/9/99	P	3079, 3220*
99.1-3.03	TSWs - Automatic Scheduling	H	1/12/99	1/13/99	P	
99.1-3.04	TSWs - Batch Scheduling	M	1/14/99	3/1/99	P	
99.1-3.05	Effects of TSW Updates	H	1/25/99	4/15/99	P	3074, 3125, 3200
99.1-3.06	TSW Updates before Activation	H	1/12/99	4/2/99	P	
99.1-4.01	TDRS Selection - Automatic Scheduling	H	2/9/99	2/19/99	P	3116, 3132
99.1-4.02	TDRS Selection - Batch Scheduling	M	2/22/99	2/26/99	P	
99.1-5.01	Invalid Wait List Requests - MOC Requests	H	1/5/99	1/14/99	P	
99.1-5.02	Invalid Wait List Requests - Operator Requests	M	1/13/99	1/20/99	P	
99.1-5.03	Valid Wait List Requests - MOC Requests	H	1/5/99	3/16/99	P	3077
99.1-5.04	Valid Wait List Requests - Operator Requests	M	1/12/99	3/17/99	P	
99.1-5.05	Activated Schedule Wait List Processing	H	1/21/99	3/8/99	P	
99.1-5.06	Scheduling from Wait List - Automatic Mode	H	1/11/99	4/7/99	P	3067, 3069, 3115, 3122, 3123, 3150, 3151, 3152, 3159*
99.1-5.07	Scheduling from Wait List - Semi-automatic Mode	H	1/12/99	4/6/99	P	
99.1-5.08	Wait List Enable and Inhibit	H	1/13/99	4/5/99	P	
99.1-5.09	Wait Listing Alternate SARs - MOC Requests	H	2/9/99	3/4/99	P	3119
99.1-5.10	Wait Listing Alternate SARs - Operator Requests	M	2/24/99	2/26/99	P	
99.1-6.01	Flexible USMs - Simulation Support	H	2/18/99	4/27/99	P	
99.1-6.02	Flexible USMs - Normal Support	H	2/9/99	2/16/99	P	3235

System Test Items

Test Item	Title	Priority	Start	Complete	Status	PRs
99.1-6.03	Schedule Request Freeze Interval is Reached	H	2/26/99	4/23/99	P	3170, 3171, 3172*
99.1-6.04	Default Freeze Interval is Reached	H	2/26/99	4/25/99	P	
99.1-6.05	Events Frozen When Selected for Transmission	H	2/26/99	4/20/99	P	3175
99.1-6.06	Flexible TUT	L	3/1/99	5/3/99	W	3272*
99.1-7.01	Invalid Alternate SARs - MOC Requests	H	2/8/99	2/24/99	P	
99.1-7.02	Invalid Alternate SARs - Operator Requests	M	2/26/99	3/1/99	P	
99.1-7.03	Valid Alternate SARs - MOC Requests	H	2/9/99	3/4/99	W	3162, 3164*
99.1-7.04	Valid Alternate SARs - Operator Requests	M	2/26/99	3/8/99	W	3164*
99.1-7.05	Chain Management - Edited Requests	H	2/9/99	2/26/99	P	
99.1-7.06	Scheduling using Chains - Primary Requests	H	2/9/99	3/16/99	P	3117, 3142*
99.1-7.07	Scheduling using Chains - Secondary Requests	H	3/1/99	4/26/99	W	3102, 3198, 3199, 3203, 3229, 3269*
99.1-8.01	Year 2000 - TSW Retention	H	3/22/99	4/2/99	P	
99.1-8.02	Year 2000 - Scheduling with TSWs, Service Flexibilities - Auto	H	3/22/99	3/26/99	P	
99.1-8.03	Year 2000 - Scheduling with TSWs, Service Flexibilities - Batch	H	3/22/99	3/26/99	P	
99.1-8.04	Year 2000 - Wait Listing	H	3/22/99	4/2/99	P	
99.1-9.01	Database Purging	H	2/8/99	2/17/99	P	

* PRs that were converted and deferred to a future maintenance release

Abbreviations and Acronyms

The following is list of terms and abbreviations found in this document and in other test-related documentation and reference documents.

ACQ/TRK	acquisition/tracking
ACRS	automated conflict resolution system
AIS	automated information system
ATRR	acceptance test readiness review
ATSC	Allied Signal Technical Services Corporation
BVT	build verification test
CCB	configuration control board
CCR	configuration change request
CCS	communications and control segment
CDR	critical design review
CM	configuration management
cNMOS	consolidated Network and Mission Operations Support
COTS	commercial off the shelf
CSC	Computer Sciences Corporation
CSCI	computer software configuration item
CSS	Nascom Control and Status System
CTB	communication test block
CTM	communication test message
DB	database
DBA	database administrator
DFCD	data format control document
DG	data group
DIS	data interface system
DQM	data quality monitoring
DSID	data stream ID

DTS	daily test summary
EET	end-to-end test
EIF	engineering interface
FDF	Flight Dynamics Facility
FTP	file transfer protocol
FW	firewall
GCM	ground control message
GCMR	ground control message request
GSFC	Goddard Space Flight Center
GUI	graphical user interface
GT	ground terminal
HA	high availability
HDRM	high data rate multiplexer
I&A	identification and authentication
I&T	integration and test
I/O	input/output
ICD	interface control document
IFL	interfacility link
IIR	interface incidence report
IIRV	improved interrange vector
INPG	interim NCC protocol gateway
ITRR	integration test readiness review
JISTT	Joint Integration and System Test Team
JPIC	Joint Process Improvement Committee
JSC	Johnson Space Center
KaSA	Ka-band single access
KaSAF	Ka-band single access forward
KaSAR	Ka-band single access return
KuSA	Ku-band single access
KuSAF	Ku-band single access forward

KuSAR	Ku-band single access return
LAN	local area network
LI	local interface
MA	multiple access
MAF	multiple access forward
MAR	multiple access return
MDM	multiplexer/demultiplexer
MO&DSD	Mission Operations and Data Systems Directorate
MOC	Mission Operations Center
NASA	National Aeronautics and Space Administration
Nascom	NASA communications
NCC	Network Control Center
NCCDS	NCC Data System
NCC 98	Network Control Center Data System 1998
NCD	NCC Central Delogger
NCR	NCC change request
NSM	Network and System Manager
NES	Nascom event schedule
NFE	NCC front-end
NPG	NCC Protocol Gateway
NRR	Nascom reconfiguration request
NTS	Network Testing System
OCR	Operations Control Room
ODM	operations data message
OPM	operations message
PR	problem report
RID	review item disposition
RMA	reliability/maintainability/availability
RR	requirements review
SA	single access

SAR	schedule add request
SAS	service accounting segment
S/C	sensitivity/criticality
SCD	small conversion device
SDE	software development environment
SDF	software development facility
SDPF	Sensor Data Processing Facility
SGLT	space-to-ground link terminal
SHO	scheduled service order
SHO ID	scheduled service order identification
SIC	spacecraft identification code
SLR	service level report
SMA	enhanced multiple access
SMAF	enhanced multiple access forward
SMAR	enhanced multiple access return
SN	space network
SPSR	service planning segment replacement
SQL	structured query language
SRIS	system resources infrastructure segment
SRD	system requirements document
SRM	schedule result message
SRR	system requirements review
SSA	S-band single access
SSAF	S-band single access forward
SSAR	S-band single access return
SSC	service specification code
STDN	Spaceflight Tracking and Data Network
STGT	Second TDRSS Ground Terminal
STRR	system test readiness review

STRS	schedule transmission rule set
SUPIDEN	support identification
SWO	security watch officer
T&T	Test and Training
TBD	to be determined
TBS	to be supplied
TCP/IP	transmission control protocol/internet protocol
TDRS	tracking and data relay satellite
TDRSS	Tracking and Data Relay Satellite System
TLAS	TDRS look angle system
TNC	TDRS Network Controller
TRR	test readiness review
TRS	transmission rule set
TSW	TDRS scheduling window
TT&C	tracking, telemetry and command
TUT	TDRSS Unscheduled Time
UPD	user performance data
User ID	user identification
USM	user schedule message
UTC	coordinated universal time
VIC	vehicle identification code
VID	vehicle ID
VT	vector translator
VTRS	vector transmission rule set
WSC	White Sands Complex
WSGTU	White Sands Ground Terminal Upgrade
WWW	World Wide Web
Y2K	Year 2000